

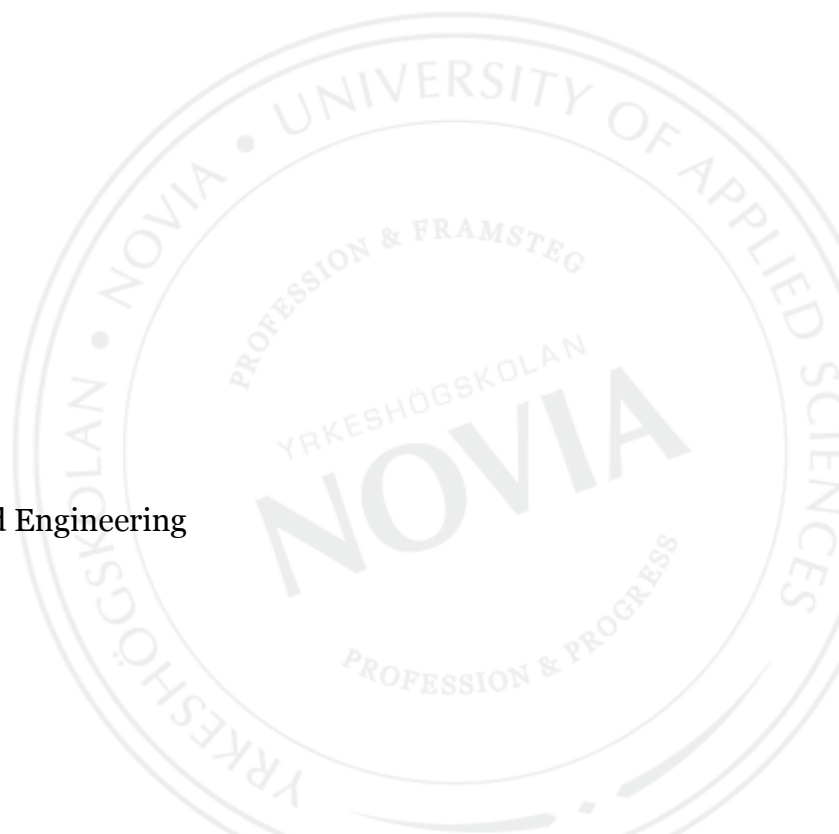
AN ATTEMPT TO DEVELOP A VALUE CREATION MODEL FOR SHUNTER LOCOMOTIVE ENGINES

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Bachelor's thesis

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BACHELOR'S THESIS

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Summary

The aim of this bachelor's thesis is to make an attempt to create a value creation model for shunter locomotive diesel engines for Wärtsilä Finland Oy. The value creation model should be based on data gathered from market research, both quantitative and qualitative. To be able to develop the value creation model, an attempt was made to determine which features and benefits regarding the engine customers prefer.

Due to the fact that the market research did not generate as much data as hoped for and lack of time, the development of the value creation model was not carried out. The result from the interviews showed that consumers overall value social and service-related matters highly. The questionnaires developed can still be used in further research and in the development of the value creation model.

Language: English **Key words:** value creation, value creation model, customer value, shunter locomotive engines

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Abstrakt

Detta lärdomsprov utfördes för Wärtsilä Finland Oy. Syftet med arbetet var att göra ett försök att skapa en värdeskapande modell för dieselmotorer i växellok. Modellen bör baseras på data insamlad genom både en kvantitativ och kvalitativ marknadsundersökning. För att kunna utveckla modellen görs även ett försök att fastställa vilka motoregenskaper användaren värderar mest.

På grund av för lite resultat från marknadsundersökningen och tidsbrist var det inte möjligt att utveckla en pålitlig värdeskapande modell. Resultatet från intervjuerna visade att generellt värderas sociala och servicerelaterade faktorer högst. De framtagna frågeformulären kan användas vid vidare forskning och utvecklandet av en värdeskapande modell.

Språk: engelska **Nyckelord:** värdeskapande, värdeskapande modell, växellokmotorer

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ABBREVIATIONS

This section lists the abbreviations used in the thesis.

CV, customer value

CVC, customer value creation

DVC, demand value chain

HOV, house of value

RZD, JSC Russian Railways, a government-owned company that handles rail transport in Russia.

Shunter locomotive, a smaller locomotive specifically used to move railroad cars around on the station and to assemble a train before a railroad locomotive takes over.

TMH, CJSC Transmashholding, a Russian manufacturer of locomotives, freight and passenger cars.

VBA, visual basics for application. Programming language used in Microsoft Office Excel.

1. INTRODUCTION

As the market has evolved to become more customer-orientated, value-based selling has also become more popular. Some claim that the implementation of value based selling is no longer optional. It is mandatory if you want to be successful within your business area. A customer no longer chooses to buy a company's product because of its functionality, features or benefits only. The customers choose the product that will provide benefits that achieve their needs (Manning 2014:145). In order to be able to offer customers a product that meets their values, you first have to find out what exactly the customers prefer and value. This study will try to establish what the customers value and with that data make an attempt to create a value based sales model within a specific business area.

1.1 Background

Wärtsilä has recently started to develop and manufacture diesel engines for shunter locomotives and the first engines were sold in the autumn of 2012. Primarily the company is focusing on the Russian market. To improve their chances on the Russian market Wärtsilä has founded a joint venture company with the Russian locomotive manufacturer CJSC Transmashholding (TMH). The rail industry is a new business for Wärtsilä and therefore they want to improve their knowledge about the market and about which engine features and benefits potential customers and end users prefer.

Russia has one of the largest railway fleets in the world. A large number of the Russian locomotive fleet is nearly obsolete at the moment and in need of renewal. Many diesel locomotives are approaching or are already past the average global life time period of 27 years. This means there will be a demand for new locomotives in Russia in the nearest future.

The Russian rail market has two major players. JSC Russian Railways (RZD) is one of the largest transport companies in the world and handles both infrastructure and rail transport in Russia. RZD is owned by the Russian government and dominates the Russian railway network. The second major player on the Russian rail market is Transmashholding. TMH is

specialized in manufacturing locomotives, passenger and freight cars. TMH is the largest supplier of diesel locomotives to RZD.

The engine that Wärtsilä has developed is a diesel engine for shunter locomotives. The developed engine is a modern 6-cylinder medium-speed engine with common rail technology. Power output is 1025 kW, cylinder output 171 kW/cylinder, piston speed 9.33 m/s, mean effective pressure 23.3 bar and speed 1000 rpm. The engine has an embedded automation system and overhaul intervals up to 24000 hours. The engine can run on a variety of fuels. In figure 1 the engine is pictured at an exhibition in Russia.



Figure 1. The Wärtsilä 20 engine for shunter locomotives at the exhibition in Moscow, Russia 2013.

1.2 Purpose

The main purpose of the thesis is to make an attempt to develop a value creation model within a specific business area. The results of the model should contain sales arguments and a graphic view of customer value. The sales arguments can later be used in the marketing process of Wärtsilä's locomotive engines and in understanding the Russian market.

The value creation model should be based on data collected from three target groups: operators, purchasers and builders of shunter locomotives. The data will be collected through interviews with representatives from these three target groups in Russia.

With the data collected from the interviews as a foundation, a formula will be drafted to calculate customer value. Bearing in mind the results from the interviews and the results given from the formula, an attempt to create sales arguments will be made. The goal is that these sales arguments will be so strong that it will be possible to execute value based selling with them.

1.3 Delimitation

This bachelor's thesis is delimited to customer value creation within the shunter locomotive engine market mainly in Russia. The model that will be developed is perhaps best fitted to be used when evaluating how well a specific engine for shunter locomotives meets customer value.

2. THEORY BUILDING

This chapter presents the theory used throughout the thesis will be presented. This will give a better understanding of how the foundation of the thesis was created.

Customer value is not a new thinking. It has been a widely known concept within marketing for several years. This has resulted in a lot of research and available frameworks. However, none of these comprehend customer value in such an extent that they are suitable to be used in every business area. Even though there are a lot of existing theories on the subject, there are not that many tools available for creating value models.

2.1 Customer value creation

For many years now companies have focused mainly on their own process, streamlining their production and reducing costs. Their main concern has been to supply their customers with goods as efficiently as possible. To gain sustainable profitability growth and a leading market position companies should also concentrate on creating value for their customers. (Gary & Plaster 2006:1)

2.1.1 Customer value

Customer value can be defined in many ways. There is not an overall consensus about what customer value is in the literature available. It can be defined as what benefits the customer receives from a product in relation to what has been given up (Woodruff 1997:140). However, it may also refer to the value received by the company, although the more commonly used phrase for this is customer lifetime value (Woodall 2003:1). This thesis work will concentrate on *the former*.

Value is not something that is determined by the seller. It is considered from the customer's point of view. Value is more than just the features of a product and purchase price. Alderman and Plaster (2006:37-41) point out that customers perceive value in areas that are not visible. This is illustrated in figure 2, where one can clearly see the different aspects that should be considered when determining customer value.

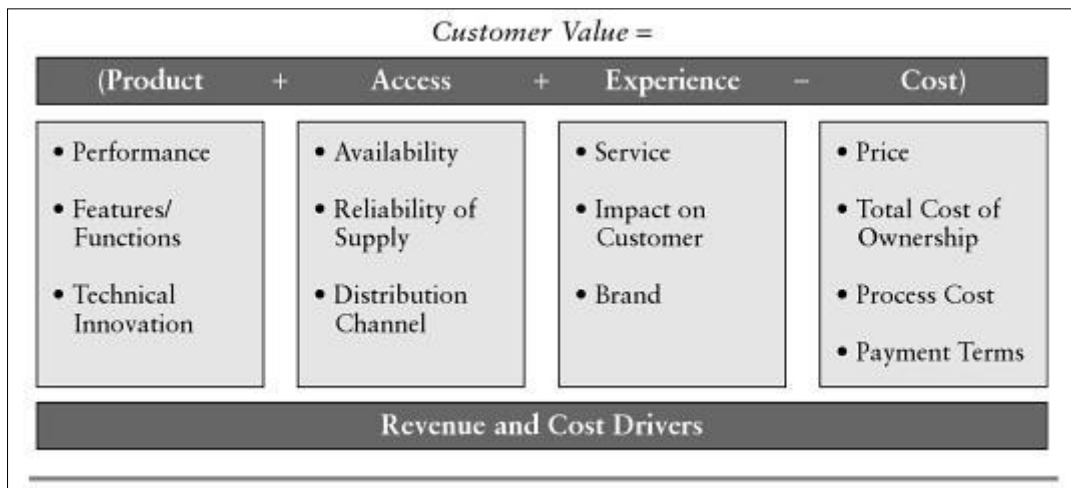


Figure 2. Customer value (Gary, Plaster 2006:7)

Similar to Alderman and Plaster, Colgate and Smith (2007:10) identify four different types of value: **functional/instrumental value**, **experiential/hedonic value**, **symbolic/expressive value** and **cost/sacrifice value**. A company can choose to focus on delivering one or more of the different types of value when adapting a customer value creation strategy.

The first type of value, *functional/instrumental* focuses on a product's features and performance. *Experiential/hedonic value* is how the consumer experiences a certain product, such as aesthetics, ambiance, excitement or knowledge. *Symbolic/expressive value* is concentrated to the personal meaning, for example comfort food, music, but also brand. The last one, *cost/sacrifice* value is when a company tries to minimize cost, risk or reduce the time and effort spent on a purchase. (Colgate & Smith 2007:10-14)

Value for a customer may vary depending on at which stage in the process the consumer is. Before the purchase is made the customer has a perception of what added value the product should contribute to his/her business. During the use of the product these expectations change and the customer may be more concerned about different attributes and solutions. For example as the product approaches the end of its life cycle the consumer may be more concerned about the availability of service or costs of disposal of the product than the purchase price. (Woodruff 1997:141)

2.1.2 The outside-in perspective

To understand fully what value is for the consumer one should adapt an outside-in perspective. The core idea of an outside-in approach is to consider everything through the customers' perspective. Furthermore companies who have embraced the outside-in perspective should base their decision making on the input from the market.

The outside in perspective may include for example making a quantitative assessment of the market, evaluating the product range from a customer perspective, identifying and working out a solution for customer problems or using a demand value chain. Furthermore a company who approaches customers from their perspective should try to strengthen their relationship with their customers to gain a better understanding of what customer value is. With a good interaction with the consumers the company will be able to respond faster to the demand on the market and thus gain a competitive advantage.

The more commonly used approach today is the inside-out perspective, where decisions are made based on the internal knowledge a company has. This means that they have formed an idea of what they believe the market needs, instead of developing and delivering what the consumers actually want. A company who still insists on using the inside-out approach will eventually loose contact with the market and struggle with delivering value. The inside-out approach has its benefits too, but it is perhaps more fitted for preserving existing products.(Alderman& Plaster 2006:23-35)

2.2 Customer value creation tools

There are a lot of tools that can be used as assistance and support in the value creation process. Different types of tools can be applied depending on what segment in the process the company wants to strengthen. For example there are various tools for assessing profitable growth opportunities, determine where on the market compared to competitive businesses the company is. Alderman and Plaster (2006:241) divide these tools into the five following categories:

- Setting the context for growth
- Gathering intelligence
- Drawing conclusions

- Implementing the strategy
- Learning from experience

2.2.1 Demand value chain

Unlike the supply chain, which focuses on cost reductions, the demand value chain is constructed to identify profitable growth opportunities. The DVC includes cost, profit and capital investment and lists the demand from right to left. DVC also visualizes the flow of money from the demand to the beginning, where the process starts. A DVC does not generate value directly. Its purpose is more to show where the profit is created. Knowing where the most of the profit is accumulated one can focus on improving the VC in other areas. (Alderman & Plaster 2006:253-258)

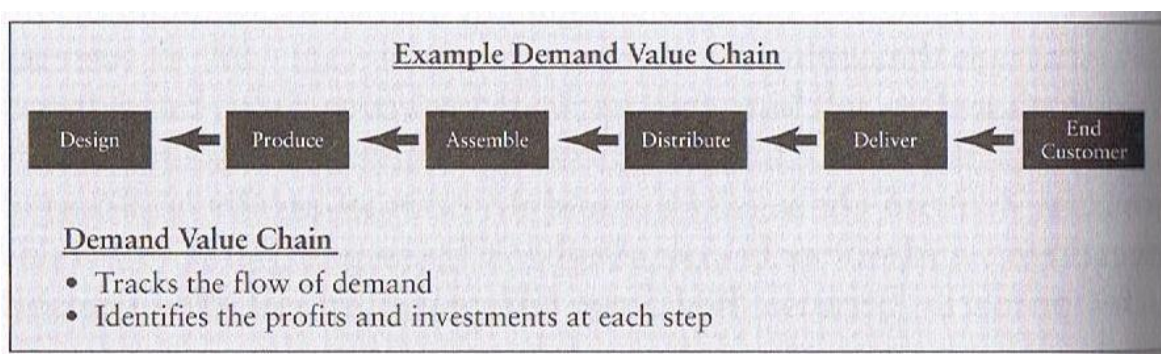


Figure 3. An example of a demand value chain (Alderman and Plaster 2006:254)

2.2.2 House of value

House of value is one of the most important tools within CVC. If used correctly, it can give the company a comprehensive view of where profitable growth opportunities can be found. It displays these opportunities in a visual way and points out where the company should make improvements. HOV combines three of the core approaches in CVC: **the outside-in perspective, value-to-the-customer perspective and fact-based company assessment.**

The HOV analysis is based on three steps. In step one the company analyzes what is needed to be able to define the value gap. The key value drivers and an assessment of competitive products on the market are done. After that in step two the growth platforms should be identified. Is it possible and profitable for our company to bridge the value gap? In step three solution concept cases should be developed. Figure 4 displays an example of

3. METHOD

In this chapter the method used in this thesis will be presented to give an understanding of how the results were reached.

3.1 Approach

The purpose of this study was to create a value creation tool that could be used on a daily basis. The data needed to create the tool were to be collected by sending out questionnaires and conducting interviews with representatives from three different target groups. It was decided to use two different ways of collecting data for two reasons. One was that with interviews you have an opportunity to interact with the interviewee and ask supplementary questions. With interviews you are also more likely to retrieve new crucial data that were not known of by the company. The reason for also using questionnaires was simply to gather more data to be able to minimize the margin of error.

3.2 Questionnaires

To prevent the questionnaires from generating misleading answers three different questionnaires were made (see appendix 1, appendix 2 and appendix 3) one for each target group. Operators, purchasers and builders of locomotives are the three main groups who work most closely with or directly impact the decision regarding whether an engine achieves customer values or not. Therefore it is also these three groups who should determine what the customer value for shunter locomotive engines is.

To be able to determine which utilities should be included in the questionnaires, research was carried out. The questions are based mostly on marketing material and engine specifications from competitive companies available on the internet. The reason for using marketing material and information available on the internet as a foundation was simply to apply the outside-in perspective on the questionnaires. The questions were mainly focused on service related matters, engine properties and ordering process. Representatives from the target groups may value properties and benefits differently. To minimize the margin of error the questions vary slightly depending on target group. The questions are not included

in the questionnaire if it is not relevant to ask representatives from the target group about that specific utility.

The surveys are structured into different sections to make them clearer to the respondent. These sections and the questions included in each section vary slightly for each questionnaire. For builders the social questions are mentioned under section 1, core questions to the builder. After core questions, technical questions follow, where all engine properties and technically related questions are listed. Service related questions are included in section 3, maintenance related questions. The structure of the operator and purchaser questionnaires is the same, except for the core questions that are excluded. This is because most of the questions in section 1 for the builders are related to the ordering process of the engine and it is not necessary to ask an operator or a purchaser of shunter locomotives about the ordering process of the engine.

In the questionnaires the respondent is asked to assess every question's importance on a scale from 1 to 6, where (6) means extremely important, (5) very important, (4) somewhat important, (3) slightly important, (2) not important at all and (1) don't know. The last option is included as an option only to minimize the margin of error. The questionnaire for purchasers can be found in appendix 1, the one for the builders in appendix 2 and the questionnaire for the operators in appendix 3.

Although this thesis mainly focuses on the Russian market, an attempt to gather data from the Scandinavian railway actors was made. After the interviews had been conducted, which is further described in chapter 3.3, the questionnaires were sent out to the Swedish and Norwegian state railway companies. Also a request to the Finnish railway company was sent to see if it would be possible to interview a few operators in Vaasa. The reason for this was to get more data, but also to get an input from another market than the Russian market.

3.3 Interviews in Moscow

The interviews were executed in Shcherbinka, Moscow in Russia at "The 4th International Rail Salon of Engineering and Technologies" exhibition. The questionnaires were used as a base in the interviews and the interviewees were asked to grade the importance of every question. They were also asked supplementary questions and given the opportunity to explain why they rated a question the way they did.

The interviewees were people visiting the exhibition, most of them representing a company from the Russian railway market. With help of two Russian translators visitors at the exhibition were asked to participate in the study. Depending on which target group the interviewees belonged to, they were asked questions from the correspondent questionnaire. In total nine interviews were conducted with three representatives from each target group. On average the interviews lasted for about 15 minutes and all interviews were conducted in Russian except for one.



Figure 5. The two Russians working for Wtec, who helped me with translations, in front of a locomotive with a Wärtsilä 20 engine.

3.4 Analysis of data

The data collected from the interviews in Russia were analyzed in Microsoft Excel. Since there were only nine respondents it was not possible to carry out a regression analysis. The mean and standard deviation were calculated separately for each question. Those questions with a significant standard deviation were considered to be irrelevant. If there was an overall consensus regarding a question between one or more of the target groups, this was noted.

4. RESULTS

In this chapter the results from the questionnaires, interviews and the value creation model will be presented.

4.1 Results from the questionnaires

The questionnaires for operator and purchaser were sent out to both the Swedish and Norwegian state railway companies. It did not however generate any data. The Swedish railway company responded and clarified that they were unable to participate, due to the fact that they do not use any diesel engines. No response whatsoever was received from the Norwegian and Finnish railway companies.

4.2 Results from the interviews in Russia

The results presented here are data gathered in interviews executed in Shcherbinka, Moscow in Russia at "the 4th International Rail Salon of Engineering and Technologies" exhibition. In the tables where the data is presented the respondents are named "P" for purchaser, "B" for builder and "O" for operator. The number following the letter is the order in which the respondents were interviewed. The properties are presented according to the mean rating, highest to lowest. The results are divided into categories different from the ones used in the questionnaire. This was done to give the reader a more comprehensive view of the data gathered.

4.2.1. Technical matters

All responses regarding engine properties are presented in Table 1. **The most significant result regarding technical matters was the overall consensus between six respondents regarding the importance of stable idle**, which they all rated as extremely important. Also worth noticing is the results for embedded automation system, small vibrations and operation in extreme weather, where the mean was high and the responses did not deviate significantly.

Also worth mentioning is the responses regarding low emissions. This property was rated as important by most respondents, except by respondent B3. The interviewee explained that this was simply because he was from Kazakhstan and the laws there are not very strict about emissions.

High maximum track speed was not ranked as an important property, with an average of 3, slightly important and the standard deviation below one. The low rating was explained by several respondents with the fact that there are speed limits where the shunter locomotive is mostly used. One builder pointed out that when loaded, lower speed is desired.

Dual fuel capability was not ranked as important either, and here it is important to notice the deviating answers. One respondent explained his low ranking with all the difficulties an engine that runs on gas would create. A shunter locomotive with a gas engine would for example need its own garage due to safety issues, especially when maintenance is carried out to minimize the risks. Builder 1 said that at the moment dual fuel capability does not interest his company, but maybe in the future it will.

The importance of small vibrations and a low noise level were emphasized by several respondents. It creates a good working condition for the operator. One operator pointed out the importance of low noise level both inside and outside the locomotive.

Most respondents found it difficult to rate the engine output. Some pointed out that different type of works and load require different outputs. Others needed the question to be more specified to be able to answer it. One builder found the question to be incorrect, because the engine output is specified when ordering.

All interviewees were asked whether they prefer wear free starting or quick start. Three respondents did not know. The rest preferred quick start, except for operator 1. His explanation to this was simply that a locomotive with quick start does not run smoothly, which causes problems for him. He rated the importance of wear free starting as very important.

Table 1. Responses regarding technical matters.

Engine properties/respondents	P1	P2	P3	B1	B2	B3	O1	O2	O3	Mean	Standard deviation
stable idle	6	6	6	6	6	6				6.00	0.00
operate in extreme weather (cold and warm)	5	5	6	6	6	6	4	6	5	5.44	0.68
small vibrations	5	5	6	6			5	6	5	5.43	0.49
low emissions CO ₂ , CO, PM, HC, NO _x	5	6	6	6	6	3	6	6	4	5.33	1.05
embedded automation system	4	4	6	6	6	6	5	5	5	5.22	0.79
small engine (size)				6	5	4				5.00	0.82
engine output	4	6	6		5	5	4	6	3	4.88	1.05
wear free or quick starting	4			5		5		6	4	4.80	0.75
smoke free starting	5	6	2				4	6	5	4.67	1.37
easy-installed engine				5	6	2				4.33	1.70
lightweight engine					5	3				4.00	1.00
dual fuel capability/gas version	4	4	6	2	3	2	4	6	2	3.67	1.49
high maximum track speed	3	3	3		3	2	3	5	2	3.00	0.87

4.2.2. Economy-related matters

Interesting findings regarding economic matters were that **low consumption of fuel, lubricating oils and coolant and low life cycle costs** were graded as very important and that the standard deviation was not significant. Furthermore it can be noted that purchase price/kW and long terms of payment were not rated very high, bearing in mind the deviating answers here.

Due to an error in the translation of the Russian questionnaires the question about low life cycle cost was unfortunately not included in the Russian form for the builders.

Table 2. Responses regarding economic matters.

Economic matters/respondents	P1	P2	P3	B1	B2	B3	O1	O2	O3	Mean	Standard deviation
low fuel consumption	5	6	6	6	6	5	6	6	4	5.56	0.68
low consumption of lubricating oils and coolant	6	4	6	6	6	4				5.33	0.94
low lifecycle cost	5	5	6	6						5.50	0.50
purchase price/kW	3	5	6	4	6	3				4.50	1.26
long terms of payment				6	4	3				4.33	1.25
low maintenance cost	5	6	6	5	6	3				5.17	1.07

4.2.3. Service related matters

Overall all the questions in the service section were graded highly on the importance scale. **Local after sales support, maintenance friendly designed engine and long engine overhaul intervals** stand out with the highest average rating and low standard deviation. Especially local after sales support seems to be a key value for the end users. One of the respondents pointed out the availability of service on short notice as really important. The availability of spare parts standard deviation is affected significantly by respondent O3's answer. Respondent B3 also graded this lower than the average. They did not give a reason why.

Table 3. Responses regarding service related matters.

Service related matters/respondents	P1	P2	P3	B1	B2	B3	O1	O2	O3	Mean	Standard deviation
local after sales support and service	6	6	6							6,00	0,00
maintenance friendly designed engine	5	5	6	5	6	4	5	6	6	5,33	0,67
long engine overhaul intervals	4	5	6	6	6	5	5	6	5	5,33	0,67
service people available on short notice	4	6	6				5	6	4	5,17	0,90
spare parts easily available	6	5	6	6	6	4	5	6	2	5,11	1,29
length of warranty time of the engine	5	5	6	5	6	3				5,00	1,00
rapid response time for technical support							5	5	4	4,67	0,47

4.2.4 Social matters

The social section was like the service related section graded highly. The mean for all the social values is 5.28 and the standard deviation is 0.73. **The value that stands out the most is the delivery time.** All respondents graded this as extremely important. Good documentation for the engine and the fact that it is in one's mother tongue seem to be key values.

Table 4. Responses regarding social matters.

Socially related matters/respondents	P1	P2	P3	B1	B2	B3	O1	O2	O3	Mean	Standard deviation
delivery time				6	6	6				6,00	0,00
documentation in your own language							5	6	6	5,67	0,47
good documentation for the engine (instruction manuals)	4	6	6				5	6	6	5,50	0,76
rapid and easy ordering process	5	6	5							5,33	0,47
technical training available	4	6	6							5,33	0,94
good communication/dialogue with engine manufacturer				4	6	6				5,33	0,94
technical support is competent and in your own language	5	5	6							5,33	0,47
low noise level	6	3	6	6	5	5	4	6	5	5,11	0,99
designated contact person regarding engine related matters							5	6	4	5,00	0,82
locally manufactured	3	5	6	4	6	5				4,83	1,07
engine manufacturer's reputation/known brand	4	4	3	6	5	6				4,67	1,11

4.2.5 Other findings

Operator 3 and purchaser 1 pointed out the temperature near the engine as a safety issue, when asked about other preferred properties not mentioned in the interview. Furthermore the operator said that an automation system is a key benefit for operators. For them it is time consuming for example to go outside if they have to check the fuel level.

Every purchaser, builder1 and operator 1 also pointed out the importance of the reliability of sensors, especially speed sensors on the engine according to the builder. Many of the respondents seemed to be interested in modern technologies. According to purchaser 3 one

of the main problems in Russia is that at the moment most of the shunter locomotives used have old technologies that are not reliable.

According to one of the builders low consumption of fuel, lubricating oils, coolant and low emissions are key benefits in Russia. One of the builders on the other hand identified the availability of service people on short notice as a key benefit in Russia. Another operator said it is preferable for him if the service is provided by the engine manufacturer.

Purchaser 1 mentioned the torque of the engine, ventilation, and quick breaks as important properties that were not mentioned in the interview. Purchaser 2 wondered how long the engine can run when the temperature is too low.

During the interviews several of the respondents commented on the engine displayed at the exhibition. Builder 3 was impressed by the two stage oiling system and the turbo charger speed. Builder 1 said it would be preferable if the engine was 7 tons heavier, then the locomotive would run more smoothly on the track.

4.3 The value creation model

Due to the fact that the attempt to gather data through questionnaires and interviews was not as successful as hoped for and also due to lack of time, the development of the value creation model had to be postponed. In chapter 7 the intended VCM will be described further.

5. DISCUSSION

The secondary objective of the thesis was to establish customer value for shunter locomotive engines. This was done through interviews conducted in Russia. One can argue that there were too few participants to be able to see a connection between the answers received. However, it is not possible to overlook an answer that is significantly deviating from the others. Every respondent has his own knowledge and background and therefore the answers are subjective. It would have been preferable to be able to interview more representatives from each target group. Then it would have been possible to see a clearer connection between the answers. More participants would also have minimized the margin of error. If one of the respondents had a different opinion than the rest of the respondents, this affected the standard deviation significantly.

The questionnaires used as a base in the interviews were, as mentioned earlier, developed with an outside-in perspective. The difficulty with this was finding out by research on the internet which features and benefits that are possibly desired by the consumers. This was very time consuming and also there was a possibility that a crucial property or benefit was left out. Therefore the respondents were asked if they found any other properties not mentioned in the interview before important, but not many respondents came to think of anything. This could mean that the questionnaires are pretty comprehensive.

To minimize the margin of error, all target groups were not asked the same questions. However, when analyzing the data I noticed that there were a few questions that perhaps the other target groups should have been asked as well. Some respondents even mentioned the properties that were not included in their questionnaire when asked about other properties they found important.

One question many seemed to struggle with was when they were asked to mention which of the emissions they found most important. It seemed to me that several of the respondents did not know what the emissions were and the translator found them difficult to explain. Therefore this question was not included when the results were presented in chapter 4.

The first day at the exhibition we approached potential respondents with English questionnaires. For some this was not a problem and they answered the questions with the

translators' help. On others the English questionnaire had a negative effect and they chose not to participate. The second day the questionnaires were translated to Russian and that was found to have a positive impact, as it became much easier to find people who were willing to participate. Although the Russian questionnaires made it easier it was still difficult to find participants.

I also noticed that many respondents answered the questions bearing in mind the Wärtsilä engine at the exhibition. It was difficult to get them to answer the questions in a general way. The first day I conducted the interviews away from the stand where the engine was and the interviewees did not answer the questions with regard to the Wärtsilä engine as much then. However, it was easier to get people to participate at the stand. The respondents interviewed away from the stand were also more willing to elaborate their answers and give comments.

The fact that there are many parties involved in the product complicates the marketing process and the sales of the engine. The target groups value properties and benefits differently. For example the operators rated the importance of an embedded automation system as very important, the builders rated it as extremely important and the majority of the purchasers rated it as somewhat important. The seller needs to take this into consideration and highlight the fact that all parties involved have different needs and preferred benefits.

6. SUMMARY

I learned a lot working with this thesis. From the literature it became clear to me in an early stage that not many companies adapt a customer value and value-based selling approach. Almost everyone seems to be aware of the benefits of implementing and working from the customer's perspective, but the difficulties of determining customer value intimidates many from implementing it. The difficulties to determine customer value and to carry out a reliable market research were something that I too struggled with in this thesis. At an early stage of this thesis work the difficulties of gathering data were identified as a major obstacle, which in the end turned out to be a fact. Although I was able to carry out interviews in Russia they did not generate enough data to create a reliable value creation model. The objective of this thesis was not met and in chapter 7 I will therefore suggest further research to be carried out.

7. FURTHER RESEARCH

Since I was unable to achieve the goal of this thesis and develop a value creation model for shunter locomotive diesel engines, I strongly suggest that the value creation model should still be further developed. With the questionnaires used and the findings of this thesis as a base I also suggest that further market research should be carried out. One of the reasons why the VCM was not finalized was the lack of input from the market. It would therefore be preferable to try to gather more data before making a new attempt to develop the VCM. This would make the VCM more reliable and you would also be able to see a clearer connection between the answers and minimize the margin of error.

7.1 The intended value creation model

The intended VCM was to be made in Microsoft Excel using VBA. The idea with the VCM was to create a possibility to compare two different shunter locomotive engines with one another. All data about each engine would have been entered into the VCM model. With help from formulas including the ratings received in the interviews as weights, the properties would be compared. The utilities that received the highest rating in the market research would have been highlighted. This includes not only technical properties such as fuel consumption, but also socially related matters.

The results generated by the intended model would have displayed value received by the consumer in a concrete way with a focus on the properties rated highly in the survey. In the model it would be possible to choose which one of the engines customer benefits would be calculated for. For example what economic impact the fuel consumption for that specific engine has for the customer in the long run. This means that the results generated from the model could be used as sales arguments and in the marketing process of the engine.

When developing the model it has to be considered if every benefit rated highly should be included in the model as something measurable. For example is it wise to include a social benefit that is hard to measure and compare if it makes it more difficult to use the model as a tool. It is important to keep in mind that it should be simple to use and as reliable as possible.

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APPENDICES

Appendix

1 INTRODUCTION TO THE SURVEY

This survey is a part of a Bachelor's thesis study. The purpose of the thesis is to make an attempt to create a value based sales model. The survey will collect information which engine properties You value.

The scale that is used in the survey is as follows. 6. Extremely important 5. Very important 4. Somewhat important 3. Slightly important 2. Not at all important 1. Don't know

SECTION 1

TECHNICAL QUESTIONS TO THE PURCHASER

1. Evaluate how important it is that the locomotive has low fuel consumption!

6 <input type="checkbox"/>	5 <input type="checkbox"/>	4 <input type="checkbox"/>	3 <input type="checkbox"/>	2 <input type="checkbox"/>	1 <input type="checkbox"/>
Extremely important				Not at all important	Don't know

2. Grade how important it is that the engine has low consumption of lubricating oils and coolant!

6 <input type="checkbox"/>	5 <input type="checkbox"/>	4 <input type="checkbox"/>	3 <input type="checkbox"/>	2 <input type="checkbox"/>	1 <input type="checkbox"/>
Extremely important				Not at all important	Don't know

3. Please estimate the importance of an embedded automation system in the engine!

6 <input type="checkbox"/>	5 <input type="checkbox"/>	4 <input type="checkbox"/>	3 <input type="checkbox"/>	2 <input type="checkbox"/>	1 <input type="checkbox"/>
Extremely important				Not at all important	Don't know

4. Please rate how important it is that the locomotive has low emissions (CO₂, CO, PM, HC, NO_x)!

6 <input type="checkbox"/>	5 <input type="checkbox"/>	4 <input type="checkbox"/>	3 <input type="checkbox"/>	2 <input type="checkbox"/>	1 <input type="checkbox"/>
Extremely important				Not at all important	Don't know

5. Which one is most important?

6. Evaluate how important it is that the locomotive has a low noise level!

6 ☐ 5 ☐ 4 ☐ 3 ☐ 2 ☐ 1 ☐
 Extremely Not at all Don't know
 important important

7. Please rate how important it is that the engine has a dual fuel version/gas version!

6 ☐ 5 ☐ 4 ☐ 3 ☐ 2 ☐ 1 ☐
 Extremely Not at all Don't know
 important important

8. How important do you think it is that the locomotive can operate in extreme weather (cold and warm)?

6 ☐ 5 ☐ 4 ☐ 3 ☐ 2 ☐ 1 ☐
 Extremely Not at all Don't know
 important important

9. Do you prefer wear-free starting or a quick start?

10. Rate the importance of the chosen option in the previous question!

6 ☐ 5 ☐ 4 ☐ 3 ☐ 2 ☐ 1 ☐
 Extremely Not at all Don't know
 important important

11. How important is it to have fuel efficiency and stable idle?

6 ☐ 5 ☐ 4 ☐ 3 ☐ 2 ☐ 1 ☐
 Extremely Not at all Don't know
 important important

12. Evaluate how important it is that the locomotive has a high maximum track speed!

6 ☐ 5 ☐ 4 ☐ 3 ☐ 2 ☐ 1 ☐
 Extremely Not at all Don't know
 important important

13. Assess the importance of the engine output!

6 ☐ 5 ☐ 4 ☐ 3 ☐ 2 ☐ 1 ☐
 Extremely Not at all Don't know
 important important

14. How important is it that the engine has small vibrations?

6 ☐ 5 ☐ 4 ☐ 3 ☐ 2 ☐ 1 ☐
 Extremely Not at all Don't know
 important important

15. Rate the importance of purchase price/kW!

6 ☐ 5 ☐ 4 ☐ 3 ☐ 2 ☐ 1 ☐
 Extremely Not at all Don't know
 important important

SECTION 2

MAINTENANCE RELATED QUESTIONS TO THE PURCHASER

1. How important is it that spare parts are easy available?

6 ☐ 5 ☐ 4 ☐ 3 ☐ 2 ☐ 1 ☐
 Extremely Not at all Don't know
 important important

2. Evaluate the importance of a maintenance friendly designed engine!

6 ☐ 5 ☐ 4 ☐ 3 ☐ 2 ☐ 1 ☐
 Extremely Not at all Don't know
 important important

3. Assess the importance of long engine overhaul intervals!

6 ☐ 5 ☐ 4 ☐ 3 ☐ 2 ☐ 1 ☐
 Extremely Not at all Don't know
 important important

4. Evaluate the importance of low maintenance cost!

6 ☐ 5 ☐ 4 ☐ 3 ☐ 2 ☐ 1 ☐
 Extremely Not at all Don't know
 important important

5. Please rate how important the length of the warranty time of the engine is!

6 ☐ 5 ☐ 4 ☐ 3 ☐ 2 ☐ 1 ☐
 Extremely Not at all Don't know
 important important

6. How long is preferred?

7. How important is the engine manufacturer's reputation and that the engine is a known brand?

6 ☐ 5 ☐ 4 ☐ 3 ☐ 2 ☐ 1 ☐
 Extremely Not at all Don't know
 important important

8. Is it important that the engine is locally manufactured?

6 ☐ 5 ☐ 4 ☐ 3 ☐ 2 ☐ 1 ☐
 Extremely Not at all Don't know
 important important

9. Is it important with local after sales support and service?

6 ☐ 5 ☐ 4 ☐ 3 ☐ 2 ☐ 1 ☐
 Extremely Not at all Don't know
 important important

10. How important is it that technical training is available?

6 ☐ 5 ☐ 4 ☐ 3 ☐ 2 ☐ 1 ☐
 Extremely Not at all Don't know
 important important

11. How important is rapid response time? (field service)

6 ☐ 5 ☐ 4 ☐ 3 ☐ 2 ☐ 1 ☐
 Extremely Not at all Don't know
 important important

12. Grade how important it is that the engine has a well documentation (instruction manuals etc.)!

6 ☐ 5 ☐ 4 ☐ 3 ☐ 2 ☐ 1 ☐
 Extremely Not at all Don't know
 important important

13. How important is it that the technical support is competent and available in your mother tongue?

6 ☐ 5 ☐ 4 ☐ 3 ☐ 2 ☐ 1 ☐
 Extremely Not at all Don't know
 important important

14. Assess how important it is that the loco is simple to use!

6 ☐ 5 ☐ 4 ☐ 3 ☐ 2 ☐ 1 ☐
 Extremely Not at all Don't know
 important important

15. Rate the importance of low life cycle cost!

6 ☐ 5 ☐ 4 ☐ 3 ☐ 2 ☐ 1 ☐
 Extremely Not at all Don't know
 important important

16. Are there any other engine properties that weren't mentioned in the above survey you find important?

17. Mention three obvious problems in purchasing locomotives today!

Thank you for your answers!

Appendix 2

INTRODUCTION TO THE SURVEY

This survey is a part of a Bachelor's thesis study. The purpose of the thesis is to make an attempt to create a value creation model. The survey will collect information which engine properties You value.

The scale that is used in the survey is as follows. 6. Extremely important 5. Very important 4. Somewhat important 3. Slightly important 2. Not at all important 1. Don't know

SECTION 1

CORE QUESTIONS TO THE BUILDERS

1. How important is the engine manufacturer's reputation and that the engine is a known brand?

6 ☐ 5 ☐ 4 ☐ 3 ☐ 2 ☐ 1 ☐
Extremely Not at all Don't know
important important

2. Rate the importance of a rapid and easy ordering process between locomotive builder and engine manufacturer!

6 ☐ 5 ☐ 4 ☐ 3 ☐ 2 ☐ 1 ☐
Extremely Not at all Don't know
important important

3. How important do you consider the delivery time to be (punctuality, total time from order date etc.)?

6 ☐ 5 ☐ 4 ☐ 3 ☐ 2 ☐ 1 ☐
Extremely Not at all Don't know
important important

4. Rate the importance of a good communication – dialogue with the engine manufacturer!

6 ☐ 5 ☐ 4 ☐ 3 ☐ 2 ☐ 1 ☐
Extremely Not at all Don't know
important important

5. Rate the importance of long terms of payment!

6 ☐ 5 ☐ 4 ☐ 3 ☐ 2 ☐ 1 ☐
 Extremely Not at all Don't know
 important important

6. Rate the importance of purchase price/kW!

6 ☐ 5 ☐ 4 ☐ 3 ☐ 2 ☐ 1 ☐
 Extremely Not at all Don't know
 important important

SECTION 2

TECHNICAL QUESTIONS TO THE BUILDERS

1. Evaluate how important it is that the engine has low fuel consumption!

6 ☐ 5 ☐ 4 ☐ 3 ☐ 2 ☐ 1 ☐
 Extremely Not at all Don't know
 important important

2. Grade how important it is that the engine has low consumption of lubricating oils and coolant!

6 ☐ 5 ☐ 4 ☐ 3 ☐ 2 ☐ 1 ☐
 Extremely Not at all Don't know
 important important

3. Please rate how important it is that the engine has low emissions (CO₂, CO, PM, HC, NO_x)!

6 ☐ 5 ☐ 4 ☐ 3 ☐ 2 ☐ 1 ☐
 Extremely Not at all Don't know
 important important

4. Which one is most important?

5. Please estimate the importance of an embedded automation system in the engine!

6 ☐ 5 ☐ 4 ☐ 3 ☐ 2 ☐ 1 ☐
 Extremely Not at all Don't know
 important important

6. Evaluate how important it is that the engine has a low noise level!

6 ☐ 5 ☐ 4 ☐ 3 ☐ 2 ☐ 1 ☐
 Extremely Not at all Don't know
 important important

7. Please rate the importance of fuel efficiency and stable idle!

6 ☐ 5 ☐ 4 ☐ 3 ☐ 2 ☐ 1 ☐
 Extremely Not at all Don't know
 important important

8. Please rate how important it is that the engine has a dual fuel capability/gas version!

6 ☐ 5 ☐ 4 ☐ 3 ☐ 2 ☐ 1 ☐
 Extremely Not at all Don't know
 important important

9. How important do you think it is that the engine can operate in extreme weather (cold and warm)?

6 ☐ 5 ☐ 4 ☐ 3 ☐ 2 ☐ 1 ☐
 Extremely Not at all Don't know
 important important

10. Do you prefer wear-free starting or quick start?

11. Rate the importance of the chosen option in the previous question!

6 ☐ 5 ☐ 4 ☐ 3 ☐ 2 ☐ 1 ☐
 Extremely Not at all Don't know
 important important

12. How important is it that the engine has a smoke free starting/operation?

6 ☐ 5 ☐ 4 ☐ 3 ☐ 2 ☐ 1 ☐
 Extremely Not at all Don't know
 important important

13. Evaluate how important it is that the locomotive has a high maximum track speed!

6 ☐ 5 ☐ 4 ☐ 3 ☐ 2 ☐ 1 ☐
 Extremely Not at all Don't know
 important important

14. Assess the importance of the engine output (horsepower)!

6 ☐ 5 ☐ 4 ☐ 3 ☐ 2 ☐ 1 ☐
 Extremely Not at all Don't know
 important important

15. How important is it that the engine has small vibrations?

6 ☐ 5 ☐ 4 ☐ 3 ☐ 2 ☐ 1 ☐
 Extremely Not at all Don't know
 important important

SECTION 3

MAINTENANCE RELATED QUESTIONS TO THE BUILDERS

1. How important is it that spare parts are easy available?

6 ☐ 5 ☐ 4 ☐ 3 ☐ 2 ☐ 1 ☐
 Extremely Not at all Don't know
 important important

2. Evaluate the importance of a maintenance friendly designed engine!

6 ☐ 5 ☐ 4 ☐ 3 ☐ 2 ☐ 1 ☐
 Extremely Not at all Don't know
 important important

3. Assess the importance of long engine overhaul intervals!

6 ☐ 5 ☐ 4 ☐ 3 ☐ 2 ☐ 1 ☐
 Extremely Not at all Don't know
 important important

4. Evaluate the importance of low maintenance cost!

6 ☐ 5 ☐ 4 ☐ 3 ☐ 2 ☐ 1 ☐
 Extremely Not at all Don't know
 important important

5. Is it important that the locomotive is locally manufactured?

6 ☐ 5 ☐ 4 ☐ 3 ☐ 2 ☐ 1 ☐
 Extremely Not at all Don't know
 important important

6. Please rate how important the length of the warranty time of the engine is!

6 ☐ 5 ☐ 4 ☐ 3 ☐ 2 ☐ 1 ☐
 Extremely Not at all Don't know
 important important

7. How long is preferred?

8. Rate the importance of low life cycle cost!

6 ☐ 5 ☐ 4 ☐ 3 ☐ 2 ☐ 1 ☐
Extremely Not at all Don't know
important important

9. Assess the importance of a lightweight engine!

6 ☐ 5 ☐ 4 ☐ 3 ☐ 2 ☐ 1 ☐
Extremely Not at all Don't know
important important

10. How important is it that the engine is small (size)?

6 ☐ 5 ☐ 4 ☐ 3 ☐ 2 ☐ 1 ☐
Extremely Not at all Don't know
important important

11. Evaluate the importance of an easy-installed engine!

6 ☐ 5 ☐ 4 ☐ 3 ☐ 2 ☐ 1 ☐
Extremely Not at all Don't know
important important

12. Are there any other engine properties that weren't mentioned in the above survey you find important!

Thank you for your answers!

Appendix 3

INTRODUCTION TO THE SURVEY

This survey is a part of a Bachelor's thesis study. The purpose of the thesis is to make an attempt to create a value based sales model. The survey will collect information which engine properties You value.

The scale that is used in the survey is as follows. 6. Extremely important 5. Very important 4. Somewhat important 3. Slightly important 2. Not at all important 1. Don't know

SECTION 1

TECHNICAL QUESTIONS TO THE OPERATOR

1. Evaluate how important it is that the locomotive has low fuel consumption!

6 <input type="checkbox"/>	5 <input type="checkbox"/>	4 <input type="checkbox"/>	3 <input type="checkbox"/>	2 <input type="checkbox"/>	1 <input type="checkbox"/>
Extremely				Not at all	Don't know
important				important	

2. Please rate how important it is that the locomotive has low emissions (CO₂, CO, PM, HC, NO_x)!

6 <input type="checkbox"/>	5 <input type="checkbox"/>	4 <input type="checkbox"/>	3 <input type="checkbox"/>	2 <input type="checkbox"/>	1 <input type="checkbox"/>
Extremely				Not at all	Don't know
important				important	

4. Which one is most important?

3. Please estimate the importance of an embedded automation system in the engine!

6 <input type="checkbox"/>	5 <input type="checkbox"/>	4 <input type="checkbox"/>	3 <input type="checkbox"/>	2 <input type="checkbox"/>	1 <input type="checkbox"/>
Extremely				Not at all	Don't know
important				important	

4. Evaluate how important it is that the locomotive has a low noise level!

6 <input type="checkbox"/>	5 <input type="checkbox"/>	4 <input type="checkbox"/>	3 <input type="checkbox"/>	2 <input type="checkbox"/>	1 <input type="checkbox"/>
Extremely				Not at all	Don't know
important				important	

5. How important is it that the locomotive has a smoke free starting and operation?

6 <input type="checkbox"/>	5 <input type="checkbox"/>	4 <input type="checkbox"/>	3 <input type="checkbox"/>	2 <input type="checkbox"/>	1 <input type="checkbox"/>
Extremely				Not at all	Don't know
important				important	

6. Please rate how important it is that the engine has a dual fuel capability/gas version!

6 <input type="checkbox"/>	5 <input type="checkbox"/>	4 <input type="checkbox"/>	3 <input type="checkbox"/>	2 <input type="checkbox"/>	1 <input type="checkbox"/>
Extremely				Not at all	Don't know
important				important	

7. How important do you think it is that the locomotive can operate in extreme weather (cold and warm)?

6 <input type="checkbox"/>	5 <input type="checkbox"/>	4 <input type="checkbox"/>	3 <input type="checkbox"/>	2 <input type="checkbox"/>	1 <input type="checkbox"/>
Extremely				Not at all	Don't know
important				important	

8. Do you prefer wear-free starting or quick start?

9. Please rate the importance of the chosen option in the previous question!

6 <input type="checkbox"/>	5 <input type="checkbox"/>	4 <input type="checkbox"/>	3 <input type="checkbox"/>	2 <input type="checkbox"/>	1 <input type="checkbox"/>
Extremely				Not at all	Don't know
important				important	

10. Evaluate how important it is that the locomotive has a high maximum speed on track!

6 <input type="checkbox"/>	5 <input type="checkbox"/>	4 <input type="checkbox"/>	3 <input type="checkbox"/>	2 <input type="checkbox"/>	1 <input type="checkbox"/>
Extremely important				Not at all important	Don't know

11. How important is it that the engine has small vibrations?

6 <input type="checkbox"/>	5 <input type="checkbox"/>	4 <input type="checkbox"/>	3 <input type="checkbox"/>	2 <input type="checkbox"/>	1 <input type="checkbox"/>
Extremely important				Not at all important	Don't know

12. Rate the importance of the engine's output! (horsepower)

6 <input type="checkbox"/>	5 <input type="checkbox"/>	4 <input type="checkbox"/>	3 <input type="checkbox"/>	2 <input type="checkbox"/>	1 <input type="checkbox"/>
Extremely important				Not at all important	Don't know

SECTION 2

MAINTENANCE QUESTIONS TO THE OPERATOR

1. How important is it that spare parts are easy available?

6 <input type="checkbox"/>	5 <input type="checkbox"/>	4 <input type="checkbox"/>	3 <input type="checkbox"/>	2 <input type="checkbox"/>	1 <input type="checkbox"/>
Extremely important				Not at all important	Don't know

2. Evaluate the importance of a maintenance friendly designed engine!

6 <input type="checkbox"/>	5 <input type="checkbox"/>	4 <input type="checkbox"/>	3 <input type="checkbox"/>	2 <input type="checkbox"/>	1 <input type="checkbox"/>
Extremely important				Not at all important	Don't know

3. Assess the importance of long engine overhaul intervals!

6 <input type="checkbox"/>	5 <input type="checkbox"/>	4 <input type="checkbox"/>	3 <input type="checkbox"/>	2 <input type="checkbox"/>	1 <input type="checkbox"/>
Extremely important				Not at all important	Don't know

4. Is it important that local service people is available on short notice?

6 <input type="checkbox"/>	5 <input type="checkbox"/>	4 <input type="checkbox"/>	3 <input type="checkbox"/>	2 <input type="checkbox"/>	1 <input type="checkbox"/>
Extremely important			Not at all important Don't know		

5. Evaluate the importance of rapid response time for technical support!

6 <input type="checkbox"/>	5 <input type="checkbox"/>	4 <input type="checkbox"/>	3 <input type="checkbox"/>	2 <input type="checkbox"/>	1 <input type="checkbox"/>
Extremely important			Not at all important Don't know		

6. Assess the importance of a designated contact person regarding engine related matters!

6 <input type="checkbox"/>	5 <input type="checkbox"/>	4 <input type="checkbox"/>	3 <input type="checkbox"/>	2 <input type="checkbox"/>	1 <input type="checkbox"/>
Extremely important			Not at all important Don't know		

7. Grade how important it is that the engine has good documentation! (instruction manuals etc.)

6 <input type="checkbox"/>	5 <input type="checkbox"/>	4 <input type="checkbox"/>	3 <input type="checkbox"/>	2 <input type="checkbox"/>	1 <input type="checkbox"/>
Extremely important			Not at all important Don't know		

8. Is it important to have engine documentation in your own language?

6 <input type="checkbox"/>	5 <input type="checkbox"/>	4 <input type="checkbox"/>	3 <input type="checkbox"/>	2 <input type="checkbox"/>	1 <input type="checkbox"/>
Extremely important			Not at all important Don't know		

9. Are there any other engine properties that weren't mentioned in the above survey you find important?

Thank you for your answers!